

IN THE CLAIMS:

1. (ORIGINAL) A method of configuring and tracking an array of probes comprising:

generating at least two movable optical traps within a vessel;

providing at least two probes within the vessel;

selecting at least two of the probes for inclusion in an array of probes

contained within the optical traps;

trapping each of the selected probes with one of the optical traps to configure the array of probes contained within the optical traps; and,

tracking the position of at least one of the trapped probes in the array by monitoring the position of the optical trap which contains it.

2-12 (CANCELED)

13. (CURRENTLY AMENDED) The method of claim [11]1, wherein the trapped probe is a chemical compound.

14-17 (CANCELED)

18. (CURRENTLY AMENDED) The method of claim [12]1 wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, RNA or combinations thereof.

19-56 (CANCELED)

57. (ORIGINAL) A method of assaying biological material comprising:

generating at least two movable optical traps within a vessel;

providing a fluid media in the vessel;

providing at least two probes for biological materials within the fluid media;

selecting at least two of the probes for inclusion in an array;

trapping each of the selected probes with one of the optical traps;

introducing into the vessel at least one target comprised of a biological material; and,

determining the reaction or lack thereof, of each of the trapped probes with each of the targets.

58-60 (CANCELED)

61. (CURRENTLY AMENDED) The method of claim [59]57, wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, RNA or combinations thereof.

62-86 (CANCELED)

87. (ORIGINAL) A method of configuring an array of probes comprising:
generating at least two movable optical traps within a vessel;
providing at least two probes within the vessel; and,
configuring an array of at least two probes by selecting each probe with one of the optical traps.

88. (ORIGINAL) A method of configuring and reconfiguring an array of probes comprising:
directing a focused beam of light at a phase patterning optical element to form a plurality of beamlets emanating from the phase patterning optical element;
directing the plurality of beamlets at the back aperture of a focusing lens to pass the beamlets through the focusing lens and converge the beamlets emanating from the focusing lens to generate movable optical traps within a vessel;
providing a plurality of probes within the vessel;
selecting at least two of the probes for inclusion in the array of probes contained within the optical traps;
trapping each of the selected probes with one of the optical traps to configure the array of probes contained within the optical traps; and

altering the position of at least one of the probes contained within the optical traps by moving the optical trap containing the probe to reconfigure the array of probes contained within the optical traps.

89-102 (CANCELED)

103. (ORIGINAL) A system for forming and tracking optical traps containing probes comprising:

- a light source for producing a focused beam of light;
- a substantially transparent vessel;
- an image illumination source for producing a beam of light illuminating contents of the vessel;
- a beam splitter for directing;
- a phase patterning optical element for receiving the focused beam of light originating from the light source and diffracting it into at least two beamlets, the phase patterning optical element having a surface for directing each of the beamlets at a back aperture of a focusing lens, the surface being alterable to change the phase profile and/or orientation of at least one of the beamlets;
- the focusing lens for converging each of the beamlets to form optical traps for containing probes; and
- a monitor for receiving the beam of light illuminating contents of the vessel and tracking the movement and contents of at least one optical trap.

104-111 (CANCELED)

112. (ORIGINAL) The method of claim 2, wherein the movement of the trapped probes are tracked based on pre-determined movement of each optical trap caused by encoding the phase patterning optical element.

113-129 (CANCELED)

130. (CURRENTLY AMENDED) The system of claim [127]103 wherein the phase patterning optical element is selected from the group consisting of gratings,

holograms, stencils, light shaping holographic filters, lenses, mirrors, prisms, or waveplates.

131-148 (CANCELED)

149. (ORIGINAL) An apparatus to form an array of optical traps comprising:

- a light source for producing a focused beam of light;
- a focussing lens having a top and bottom, the bottom forming a back aperture;
- a phase patterning optical element for receiving the focused beam of light and diffracting it into at least two beamlets, the phase patterning optical element having a surface for directing each of the beamlets at the back aperture of the focussing lens;
- a first light channel having first and second ends, the first end in communication with the phase patterning optical element;
- a second light channel having first and second ends, the first end intersecting the second end of the first light channel;
- a third light channel having first and second ends, the first end in communication with the second end of the second light channel;
- a first mirror for reflecting the beamlets emanating from the phase patterning optical element through the first light channel;
- a first set of transfer optics disposed within the first light channel, aligned to receive the beamlets reflected by the first mirror;
- a second set of transfer optics disposed within the first light channel, aligned to receive the beamlets passing through the first set of transfer lenses;
- a second mirror positioned at the intersection of the first light channel and the second light channel, aligned to reflect beamlets passing through the second set of transfer optics through the third light channel;
- a third mirror disposed within the third light channel for reflecting beamlets passing through the third light channel to the back aperture of the focusing lens and forming an array of optical traps.

150-157 (CANCELED)